

her into a small cup containing a number of larvæ. She worked continuously till half past seven in the evening, when I left off watching. During that time she had made more than ninety journeys, carrying each time a larva to the nest. During the whole time not a single other ant came to the larvæ.

Again on the 7th Feb. I watched two ants in the same manner. At 7 A.M. I put some larvæ in the small china cups. Up to 8 no ants had come to them. Soon after 8 I put two marked ants, neither of them being the same as these whose movements are above recorded. They were then watched until a quarter to eight in the evening, during which time one of them had made twenty-six journeys, carrying off a larva each time; the other forty-two. During this period of about eleven hours, two strange ants had come to the cup at which these were working, and the same number to one of the other cups.

None of these ants, therefore, though they had found a large number of larvæ, more than they could carry in a whole day, summoned any other to their assistance.

Diagnoses of new Genera and Species of Hydroida.

By Professor ALLMAN, M.D., LL.D., F.R.S., Pres. L.S., &c.

[Read December 17th, 1874.]

(PLATES IX.-XXIII.)

SOME very interesting collections of Hydroida have been recently placed in my hands for determination. One of the most important of these is from the Zoological Museum of the University of Copenhagen, and consists exclusively of gymnoblastic forms. It has been obtained from various parts of the world; but most of the species are from the Scandinavian shores. It has been put into spirits, and is, for the most part, in a very good state of preservation, so much so, indeed, as frequently to admit of accurate drawings being made from the soft parts. Among the Hydroids of this collection sufficiently well preserved for determination, are seven undescribed species, referable to six genera. For the opportunity of examining it I am indebted to Professor Lütken, of the University of Copenhagen.

Another collection, also preserved in spirits, consists entirely of calyptoblastic forms, and was made in the Japan seas by Capt.

St. John, of H.M.S. 'Silvia.' It was submitted to me for determination by Mr. J. Gwyn Jeffreys, by whom it is destined to form part of the collection of the British Museum. It consists of seven species; and not one of these has been hitherto described. They are referable to four genera, of which two, namely *Campanularia* and *Thuiaria*, are well represented in the European seas, while two are now for the first time defined, and, so far as I know, have no representatives elsewhere.

This collection, though small, is thus of special interest, coming as it does from a region whose Hydroid fauna has been hitherto entirely unexplored, and which, I am strongly induced to believe, constitutes a distinct and well-defined area in the geographical distribution of the Hydroida.

To Mr. Busk I am indebted for a collection of calyptoblastic Hydroids, consisting entirely of dried specimens or of specimens which, after having been dried, had been mounted in liquid for the microscope. It contains a large number of species: many of these have been already examined and described by himself; many others he has also examined, designated by MS. names, and, in many cases, figured, so that his very careful and accurate work only awaits publication. Others, again, hitherto unexamined, he has liberally intrusted to myself; and these are described and figured in the present paper.

From Mr. Holdsworth I have received a collection of dried specimens, made on the shores of Ceylon. It contains several new and interesting species, chiefly belonging to the Aglaophenian section of the Plumulariidae.

Lastly, a small collection of Hydroida and Polyzoa was made by the Rev. A. E. Eaton during a yacht voyage to Spitzbergen. The specimens were collected in the Spitzbergen seas, and were placed by Mr. Eaton at my disposal. Among the Hydroids, however, of this collection there is only one specimen sufficiently well preserved for determination.

HYDROIDA GYMNOBLASTEÆ.

BOUGAINVILLIIDÆ.

PERIGONIMUS.

PERIGONIMUS MULTICORNIS. Plate IX. figs. 1, 2.

Trophosome. Hydrocaulus attaining a height of about two inches, springing from a creeping network of hydrorhizal tubes, not

fascicled, very much branched, with a subalternate disposition of the branches, which ascend at a small angle from the main stem and from one another; ultimate ramuli annulated at their origin, rest of the hydrocaulus smooth, except with an occasional annulation here and there. Hydranths with about forty tentacles.

Gonosome. Gonophores springing from the ultimate ramuli at some distance below the hydranth.

Locality. Kattegat, collected by Mr. Oersted, *Zool. Mus. Cop.*

The gonophores in the specimen were not sufficiently far advanced to enable their true structure to be determined; and little more than their position in the hydrosoma can be asserted of them. Their appearance, however, renders it highly probable that they become developed into planoblasts of the type met with in the genus *Perigonimus*; but in the absence of an accurate knowledge of the developed gonosome, the reference of the present species to that genus cannot be viewed as otherwise than provisional.

The most striking peculiarity of the species is the great number of tentacles in the hydranth.

EUDENDRIIDÆ.

EUDENDRIUM.

EUDENDRIUM RIGIDUM. Plate IX. figs. 3, 4.

Trophosome. Hydrocaulus attaining a height of about one inch, much and very irregularly branched, springing out of an entangled mass of tortuous wiry filaments, fascicled in the main stem and principal branches; subordinate branches not fascicled, capillary, and strongly annulated throughout, the whole forming rigid tufts. Hydranths with about twenty tentacles.

Gonosome not known.

Locality. Denmark, *Zool. Mus. Cop.*

There can be little doubt that the Hydroid just described is a true *Eudendrium*; for though no gonosome was present in the specimen, the trophosome is entirely that of a *Eudendrium*; and, from all we know of the species of *Eudendrium*, the trophosome of this genus will in itself afford characters sufficient for generic determination.

The species here described bears a considerable resemblance to *Eudendrium capillare*; but the strongly fascicled condition of the main stem and principal branches, and the complete annulation

of the unfascicled portion, at once distinguish it from that species. It is this fascicled condition which gives it the rigid habit which has suggested its specific name.

Such hydranths as are present in the specimen are evidently those of a second crop which had replaced an earlier one—a phenomenon not uncommon in Hydroid trophosomes. Each is borne on the summit of an attenuated continuation of the original branch; and the new growths have much the appearance of having been produced in the confinement of an aquarium; at all events, the attenuated extension of the branches is plainly not the normal condition of these parts.

HYDRACTINIIDÆ.

HYDRACTINIA.

HYDRACTINIA MONOCARPA. Plate X. figs. 1–3.

Trophosome. Basal expansion thin, furnished with well-developed chitinous spines; spines with a continuous axile cavity, and destitute of longitudinal furrows, except close to the base, frequently bifurcate. Hydranths with about twelve tentacles.

Gonosome. Blastostyles short, destitute of capitulum, and terminating distally in a blunt point; each blastostyle (female) carrying near its middle a single very large sessile spherical sporosac.

Locality. Spitzbergen, *Zool. Mus. Cop.*

This is a very interesting and well-marked form. It is easily distinguished from *H. echinata* by its nearly smooth spines, and especially by its noncapitate blastostyles, each with its single sporosac. The sporosac is very large, and encloses a great number of ova; while that portion of the blastostyle which lies at the distal side of the point of attachment of the sporosac is much attenuated, and bent to one side by the enormously developed sporosac. The blastostyle, with its sporosac, presents entirely the condition met with in certain calyptoblastic Hydroids, in which the gonangium contains only a single sporosac, by the great development of which the blastostyle becomes more or less atrophied and displaced.

The basal expansion is thin, and its chitinous framework far less developed than in *H. echinata*. The superficial cœnosarcal layer is very distinct, and is extended over the whole surface of the spines.

The chitinous walls of the hollow spines, besides presenting a

general lamination, consist of two distinct layers. The external one, itself distinctly laminated, forms a sort of sheath which invests the inner one, also laminated, and can be separated from it by the needle. The tubular cavity of the spine, which is continuous from its summit to its base, is filled with cœnosarc.

The description here given is that of a female colony, no male specimen being contained in the collection.

The colony covered the surface of a gasteropodous shell, *Trophon clathratum*, Linn., which was obtained off the coast of Spitzbergen, and is still inhabited by the mollusk. Its high northern locality thus gives to *Hydractinia monocarpa* a special interest from a distributional point of view.

PODOCORYNIDÆ.

PODOCORYNE.

PODOCORYNE INERMIS. Plate X. figs. 4, 5.

Trophosome. Hydrorhizal expansion forming a thin layer entirely destitute of projecting chitinous spines. Proliferous hydranths but slightly smaller than the sterile hydranths.

Gonosome. Gonophores forming a verticillate cluster at a short distance below the tentacles.

Localities. Oeresund and Middelfartsund, Denmark, *Zool. Mus. Cop.*

The present species comes very near to *Podocoryne carnea*, and may possibly be only a varietal modification of it. It differs from it, however, in the entire absence of the chitinous spines which in *P. carnea* are developed from the hydrorhizal expansion, as well as in the much less arrested condition of the proliferous hydranths. It is possible that specific characters may be afforded by the free planoblasts; but the exact form of these can be determined only from living specimens.

The specimens occur on the shells of young living individuals of *Nassa reticulata*.

CLADOCORYNIDÆ.

CLADOCORYNE.

CLADOCORYNE PELAGICA. Plate X. figs. 6, 7.

Trophosome. Hydrocaulus attaining a height of about one fifth of an inch, simple, with the perisarc distinctly annulated towards the base.

Gonosome. Gonophores borne singly on short peduncles, which spring from the body of the hydranth within the tentacles.

Habitat. On *Sargassum bacciferum*.

Locality. Gulf-stream, collected by Mr. Hygom, *Zool. Mus. Cop.*

Hitherto only one species of the genus *Cladocoryne* has been described. This (*C. floccosa*) was discovered by Mr. W. D. Rotch, in Herm, one of the Channel Islands; but no trace of the gonosome was present in any of his specimens, and it was therefore impossible to draw up a complete character of either the species or the genus. The specimens of the new species from the Copenhagen Museum supply in some degree the deficiencies in our knowledge of this remarkable genus, though they still leave much to be determined. It seems pretty certain that the gonophores are phaneroconic or medusiform; but the state of the specimens does not allow of an absolute determination of this point.

Cladocoryne pelagica is a smaller form than *C. floccosa*, from which it also differs in the very distinctly annulated condition of the lower part of its stem. It had attached itself to gulf-weed obtained in lat. 57° N., long. 13° W., by the late Mr. Hygom, who, as I am informed by Prof. Lütken, was "the captain of a trading-vessel, and a zealous and intelligent collector."

CORYMORPHIDÆ.

AMALTHÆA.

AMALTHÆA ISLANDICA. Plate IX. figs. 5, 6.

Trophosome. Hydrocaulus attaining a height of about $1\frac{1}{10}$ inch, swollen below, where it is provided with numerous rows of papilliform processes, which become longer as they approach the base, and are ultimately replaced by long filaments, which form a dense tow-like hydrorhizal plexus. Proximal tentacles about twenty in number, and about $\frac{8}{10}$ of an inch in length; distal tentacles rather long, very numerous, and forming a dense terminal brush.

Gonosome. Gonophores oval, in about nine pendulous clusters, each cluster consisting of numerous gonophores, which are borne on short stalks from all sides of a rather long common peduncle; more mature gonophores with four short tentaculiform processes on the summit.

Locality. North Iceland, *Zool. Mus. Cop.*

This is an interesting Hydroid, and, as far as can be determined from the specimen, is an *Amalthæa* nearly allied to *Amalthæa*

sarsii, Steenstrup, from which it would seem to differ chiefly in its shorter stem, less numerous proximal tentacles, and longer distal ones, and in the simple common peduncles of its gonophore-clusters. The structure of its gonophores, however, could not be determined with certainty; and though these appear to develop into true planoblasts of the *Amalthæa* type, it was impossible, from a mere spirit specimen, to satisfy one's self entirely on this point. The reference of the Hydroid to the genus *Amalthæa* is thus, to a certain extent, provisional.

One of the most striking features in the present species consists in the great length of its proximal tentacles. These nearly equal the entire height of the stem, round which, in the living state of the animal, they must have formed a graceful inverted tassel of flexile filaments, subject to the impulse of every passing current of the surrounding water.

The thin pellicle which in *Amalthæa* replaces the strong perisarc of other Hydroids, was here irregularly corrugated and separated by a considerable interval from the ectoderm of the stem; but this latter state was probably connected with the alcoholized condition of the specimen.

MONOCAULIDÆ.

MONOCAULUS.

MONOCAULUS GRÆNLANDICA. Plate IX. figs. 7, 8.

Trophosome. Hydrocaulus attaining a height of about 1 inch, emitting towards the base numerous capillary filaments. Hydranths with the tentacles of the proximal zone moderately long, about twenty in number; tentacles of the distal zone very short and numerous.

Gonosome. Gonophores oviform, destitute of tentaculiform appendages, in seven or eight clusters, each cluster consisting of numerous gonophores, which are borne on all sides of a common peduncle, on which they are sessile.

Locality. Greenland, collected by Hollböll, *Zool. Mus. Cop.*

There can be scarcely any doubt that the gonophores of this Hydroid are simple fixed sporosacs, and that the species is rightly referred to the genus *Monocaulus*. The pellicle, which takes the place of the perisarc, is somewhat thicker than in *Corymorpha* and other so-called naked Hydroids, but is yet very different from the thick firm perisarc of *Tubularia*, *Eudendrium*, &c. It

loses itself on the base of the hydranth, and in the specimen is irregularly corrugated and separated along the stem by a considerable interval from the ectoderm, this interval becoming still wider at the base of the stem; the separation of the pellicle from the ectoderm, however, may be due to the action of the alcohol in which the specimen is preserved.

The filaments, which are emitted from the stem, commence at some distance above the base; they are simple and capillary, and are each surrounded by a delicate extension of the investing pellicle of the stem.

The proximal tentacles, which are of moderate length, taper towards their extremity, where they end in a blunt, slightly enlarged extremity, showing an apparent tendency to a capitate termination. The distal tentacles, which are very short and very numerous, cover a narrow zone just below the mouth.

The clusters of gonophores lie, in the specimen, entirely at the distal side of the longer tentacles; and it does not seem that in the living state of the Hydroid they could have formed pendulous groups hanging below the tentacular verticil. No evidence of the sex of the specimen could be obtained.

The specimens are adhering by their base to fragments of shell, and seem to have been dredged from a bottom of shelly sand. They were collected by Mr. Holböll, mentioned in a note from Prof. Lütken as "the lamented Governor of South Greenland, a zealous and able collector."

HYDROIDA CALYPTOBLASTEA.

CAMPANULARIIDÆ.

CAMPANULARIA.

CAMPANULARIA CRENATA. Plate XI. figs. 1, 2.

Trophosome. Hydrophyton a creeping adherent filament, which sends off from distance to distance short free hydrotheca-bearing branches; adherent portion smooth, hydrothecal branches very distinctly ringed, slightly thinner than the adherent portion. Hydrothecæ deep and narrow, about $\frac{1}{10}$ of an inch in height, somewhat tumid at the base, slightly contracting upwards, and then gradually expanding at the orifice, so as to form an everted lip; margin of orifice crenate, with eight broad shallow lobes.

Gonosome. Not known.

Locality. Japan, *Capt. St. John.*

This Campanularian is remarkable for the comparatively large size of its hydrothecæ, with their elegantly crenate lip. It occurred creeping over the stems of a *Thuiaria* (*T. crassicaulis*). The specimen is well preserved, many of the hydranths being still quite perfect in the hydrothecæ; but the absence of all knowledge of the gonosome renders its reference to the genus *Campanularia* entirely provisional.

CAMPANULARIA GRANDIS. Plate XII. figs. 2-4.

Trophosome. Hydrophyton consisting of creeping, tortuous, smooth, more or less aggregated tubes, which send off from distance to distance the peduncles of the hydrothecæ; peduncles slightly thinner than the tubes from which they spring, scarcely attaining a length equal to that of the hydrothecæ, immediately below which they have a node-like enlargement. Hydrothecæ $\frac{2}{10}$ of an inch in height, gradually narrowing upwards, and terminating with an abruptly everted lip.

Gonosome. Gonangia springing in a dense cluster from the aggregated basal tubes, nearly sessile, lageniform, with strong longitudinal ridges, slightly exceeding a quarter of an inch in height.

Locality. Japan, *Capt. St. John.*

The comparatively enormous size of the hydrothecæ constitutes a very remarkable feature in this Hydroid. It is also strikingly marked by its very large, lageniform, ridged gonangia.

The adherent portion of the hydrophyton consists of strong tubes which creep over the surface to which it has attached itself. In the specimen examined it had taken possession of another Hydroid (*Selaginopsis fusca*), the older parts of whose stem it had enveloped in a close plexus. This plexus had entirely replaced the stem which had originally given it support; and it was from this part that the gonangia sprung in a dense group. They had the appearance of being sessile, but are in reality borne each upon a very short peduncle. Their large size and the peculiar way in which they were grouped together suggested at first the possibility of their being only the ovarian nidus of a gastropodous mollusk instead of the gonangia of the Hydroid. They attain about the size of the nidus of *Buccinum lapillus*; and it was only by a careful examination that their real nature was

made apparent. It was impossible, however, from the dead specimens to determine whether the contents of the gonangia were sporosacs or planoblasts; and it is therefore, as in all similar cases, only provisionally that the present Hydroid can be assigned to a definite genus.

CAMPANULARIA GRACILIS. Plate XII. figs. 5, 6.

Trophosome. Hydrophyton a slender, smooth, creeping tube, sending off from distance to distance long slender hydrothecal branches; hydrothecal branches with one or two rings at their origin from the creeping stem, and two deep constrictions at the base of the hydrotheca, destitute of annulation on the remainder of their length. Hydrothecæ deep bell-shaped, about $\frac{1}{30}$ of an inch in height.

Gonosome. Gonangia borne by the creeping tube, scattered, cylindrical, about $\frac{1}{15}$ of an inch in height, deeply and regularly annulated, tapering below into a short peduncle, and terminating distally in a truncated summit.

Locality. Japan, *Capt. St. John.*

This little Campanularian occurred abundantly on the same Hydroid which gave support to *Campanularia grandis*, and crept also over the stems and hydrothecæ of the latter, with whose great size this small form strikingly contrasted. Numerous young solitary individuals, with the embryonal hydrorhizal shield still present, had attached themselves to the supporting-Hydroids.

Though the hydranths were sufficiently well preserved, nothing could be determined regarding the contents of the gonangia; and without a knowledge of these the reference of the Hydroid to the genus *Campanularia* is only provisional. It is probably, however, a true *Campanularia*, and appears to be nearly allied to *C. Johnstoni*.

CAMPANULARIA JUNCEA. Plate XI. figs. 3, 4.

Trophosome. Hydrocaulus consisting of a cluster of strong stems, which spring from a common entangled mass of hydrorhizal filaments, and, after rising to some height as simple undivided tubes, begin to send off thinner, simple, for the most part alternately disposed branches, and continue to ascend to a height of about 12 inches, becoming gradually thinner towards the distal extremity. Hydrothecæ large, tobacco-pipe-shaped, almost sessile, supported on bracket-like lateral processes, which are situated

close to the distal ends and on alternate sides of rather short internodes, into which both main tube and branches are divided; margin of orifice entire, surrounded by a narrow band-like rim.

Gonosome. Not known.

Locality. Ceylon, Mr. Holdsworth.

Campanularia juncea is a very large, strong species; the stems, towards their base, where they are as yet unbranched, have a thickness of about $\frac{1}{20}$ of an inch, and might here almost be taken for a cluster of the stems of *Tubularia indivisa*. The specimens were all incrustated with an opaque calcareous deposit; and when freed from this, the stems presented a light-brown glossy surface marked by shallow longitudinal corrugations. The hydrothecæ have a singular resemblance to the usual form of the bowl of a tobacco-pipe; they measure about $\frac{1}{10}$ of an inch in height, and contract below into a very short peduncle, by which they are supported on the bracket-like processes of the hydrocaulus. The branches are considerably thinner than the main stem, from which they spring at a wide angle; they attain a length of from $\frac{1}{2}$ an inch to about 2 inches, and are mostly given off from alternate sides.

The Hydroid grew in dense clusters of closely approximated tubes; the clusters often measure at their base 1 or 2 inches in diameter.

As nothing is known of the gonosome, the reference of this species to *Campanularia* is provisional.

SERTULARIIDÆ.

SERTULARELLA.

SERTULARELLA JOHNSTONI, Gray. Plate XIII. figs. 1, 2.

Syn. *Sertularella Johnstoni*, Gray, in Dieffenbach's New Zealand;

Coughtrey in Journal of Otago Institute, May 1874.

Sertularella gracilis, Allman, MS.

Trophosome. Hydrocaulus attaining a height of about 4 inches, very slender, much and irregularly branched; branches zigzag, sending off pinnately-disposed alternate ramuli at regular intervals along their length, the whole forming a dense tuft. Hydrothecæ carried each near the middle of a rather short, well-defined internode, adnate to the internode for about half their height, free portion slightly contracted; orifice with three well-marked teeth, one of which is superior and two lateral.

Gonosome. Gonangia borne both upon the main stem and the

ramuli, each springing from a point just below a hydrotheca, obovate, gradually contracting below into a short peduncle, terminating above in a tubular orifice, which is situated eccentrically on the truncated summit, distinctly and closely annulated in its entire length.

Locality. New Zealand, *Mr. Busk's collection.*

Mr. Coughtrey's amended description of the *Sertularella Johnstoni* of Gray renders it pretty certain that Gray's description was intended to apply to the present species, and necessitates the suppression of the specific name "*gracilis*," under which I had originally described it, in favour of the name previously assigned to it by Gray*. It is a delicate and very elegant species, rendered obvious to the naked eye by the tufts of long slender stems with their regular pinnately disposed ramuli. In the same collection is a form differing from that here described in the central position of its less decidedly exerted gonangial orifice; in all other respects it is indistinguishable from it. I regard the difference as merely varietal or possibly sexual.

SERTULARELLA INTEGRÆ. Plate XIII. figs. 3, 4.

Trophosome. Hydrocaulus attaining a height of about an inch, simple, or sparingly branched. Hydrothecæ adnate to each internode by somewhat more than a third of their height, slightly swollen below, becoming gradually narrower towards the orifice, marked upon the upper side with shallow annulations, orifice destitute of teeth.

Gonosome. Gonangia springing from a point just below the base of a hydrotheca, ellipsoidal, marked in somewhat more than the distal half by shallow annulations, terminating by a tubular 4-toothed orifice.

Locality. New Zealand *Mr. Busk's collection.*

The perfectly even rim of the hydrotheca, destitute of all trace of teeth, is an obvious feature in this species. Just within the orifice, upon the inferior walls of the hydrotheca, is a very distinct

* The proof-sheets of the present paper were passing through my hands when, by the kindness of Mr. Coughtrey, I received a copy of his "Notes on the New Zealand Hydroideæ," read before the Otago Institute, May 1874. The paper is accompanied by figures, and amends in many important points the descriptions already given by Gray (Catalogue in Driffenbach's 'New Zealand') and by Captain Hutton ("On the New Zealand Sertularians," Trans. New Zeal. Inst. vol. v. 1872). Without such figures and corrections it would, indeed, in many cases be impossible to identify the species to which the descriptions of these naturalists refer.

conical process, similar to that which in other Hydroids (*Thuiaria*) gives attachment to a valve-like operculum. No trace of the operculum was detected in the dried specimens.

SERTULARELLA EPISCOPUS. Plate XIII. figs. 5-7.

Syn. *Sertularia fusiformis*, Hutton in Trans. N. Z. Inst. 1872; Coughtrey in Journ. Otago Inst. 1874.

Trophosome. Hydrocaulus attaining a height of about an inch, simple, given off at short intervals from a creeping ramified tubular fibre. Hydrothecæ tubiform, springing from the distal end of the supporting internode, to which they are attached by their fundus, free in the remainder of their height, and strongly diverging from the stem; orifice deeply cleft above and below, so as to present a mitre-like form, bordered by a thickened margin, below which, on the side facing the internode, there is a thickened involution of the walls of the hydrotheca.

Gonosome. Gonangia elongated, ovoid, with one wide and shallow, and two narrow and deep longitudinal depressions, which extend from the summit to the base, supported on a short thickish peduncle, springing one from each internode at the side opposite to that which carries a hydrotheca.

Locality. New Zealand, *Mr. Busk's collection.*

Notwithstanding a want of sufficient exactness in the description given by Captain Hutton of his *Sertularia fusiformis*, there can, I think, be little doubt that that species is identical with the *Sertularella episcopus* of the present paper. The name of *fusiformis*, however, has been already assigned by Hincks to a very different British species, and therefore cannot be given to the New-Zealand one. Mr. Coughtrey has in some points amended Captain Hutton's description, and has given us a figure of the species.

The remarkable mitriform and margined hydrothecæ of this curious Hydroid at once distinguish it from all other known species. The hydrothecæ, besides diverging from the stem to the right and left, spring more decidedly from one of the remaining two sides than from the other, and are directed at a low angle from the plane of this side. The stem thus presents an anterior (from which the hydrothecæ spring) and a posterior, as well as a right and a left side. The origin of the gonangia is also somewhat from the anterior side of the internode.

The specimens formed a dense growth on the surface of a fucoid

alga. In every instance the gonangia presented a collapsed appearance, with wide longitudinal depressions (mostly three) separated from one another by narrow longitudinal ridges. This condition was not obliterated by boiling in water or in a solution of caustic potash; but it is possible that it does not exist in the living Hydroid.

SERTULARIA.

SERTULARIA ARCTICA. Plate XIV. figs. 1, 2.

Trophosome. Hydrocaulus attaining a height of about $1\frac{1}{2}$ inch, main stem undivided, slightly zigzag, sending off pinnately disposed alternate ramuli, each internode of the ramuli carrying, near its middle, a pair of opposite, or nearly opposite, hydrothecæ. Hydrothecæ elongated, free, and divergent from the internode for rather more than their distal half, narrowing towards the aperture; aperture cleft, so as to present two broad lateral teeth, to the lower angle between which is attached a valve-like operculum.

Gonosome. Gonangium springing from the internode, just below the base of a hydrotheca, elongate-ovate, with a constriction a little beyond its middle, terminating distally in a rather wide tubular outlet.

Locality. Spitzbergen, *Mr. Eaton.*

This is an elegant and delicate little species. It is difficult to determine the exact form of the hydrothecal orifice, the walls being here very thin and collapsible. In most of the hydrothecæ the appearance of an imperfect diaphragm could be seen at some distance within the orifice.

DESMOSCYPHUS, nov. gen.

Trophosome. Hydrocaulus jointed, each internode corresponding to one or more pairs of hydrothecæ. Hydrothecæ adnate to one another in pairs, and each pair adnate to the front of the hydrocaulus.

Gonosome. Gonangia simple, borne along the front of the hydrocaulus.

The genus *Desmoscyphus* resembles *Thuiaria* in its hydrothecæ being adnate to the hydrocaulus; but it differs from it in the fact of its hydrothecæ being also adnate to one another in pairs, which are thus all brought to one side of the hydrocaulus, and in the further fact of certain parts of its hydrocaulus being divided into

regular internodes, which correspond in number to the pairs of hydrothecæ.

DESMOSCYPHUS BUSKII. Plate XIV. figs. 3-7.

Trophosome. Hydrocaulus attaining a height of about 3 inches; main stem sending off at irregular and distant intervals pinnately disposed ramuli, which are much attenuated at their origin, and are divided into regular internodes, each of which carries one pair of hydrothecæ. Hydrothecæ swollen below, narrowing towards the orifice, and here slightly curving outwards; orifice oval, entire; pairs of hydrothecæ closely approximate on the pinnæ, but on the main stem separated from one another by considerable intervals; main stem with only an occasional joint at distant and irregular intervals.

Gonosome. Gonangia ovoid, with a truncated contracted summit, springing from the front of the pinnæ between the diverging summits of the hydrothecæ.

Locality. New Zealand, *Mr. Busk's collection.*

The present Hydroid occurs attached to a *Sertularella* indistinguishable from the widely distributed *Sertularella gayii*. The greatest diameter of the hydrothecæ is not seen in a directly front or in a directly lateral view of the stem or pinnæ, but only when viewed in a position intermediate between these two. The inner surface of the gonangium just within its orifice is set with some irregular short furcate spines.

SYNTHECIUM.

Trophosome. Hydrocaulus divided into internodes, each internode carrying a pair of opposite sessile hydrothecæ.

Gonosome. Gonangia supported upon peduncles which spring from within the cavity of certain hydrothecæ, where they take the place of the hydranth.

The genus *Synthecium* is characterized by a feature which is absolutely without parallel in any other known group of hydroids. This is found in the relation of certain hydrothecæ to the gonangia, the peduncle of the hydrotheca being enclosed within the cavity of the gonangium.

The hydrothecæ which thus carry gonangia differ in no respect, either in form or position, from those which continue to exercise the normal function of giving protection to the hydranth; and I can find no clue to the meaning of this most exceptional character.

SYNTHECIUM ELEGANS. Plate XV. figs. 1-3.

Trophosome. Hydrocaulus attains a height of about 2 inches, springing from a creeping tubular filament and soon sending off opposite pinnately arranged branches; internodes separated from one another by a deep constriction. Hydrothecæ borne along both the main stem and its branches, deep, tubular, cylindrical, with perfectly even orifice, adnate to the internode for about two thirds of their height, and then becoming free and curving outwards.

Gonosome. Gonangia large, elliptical, opening on the summit by a tubular orifice, strongly annulated, with the annular ridges, discontinuous, where they meet a mesial zigzag line on the front and the back of the gonangium, peduncle of gonangium entirely concealed within the hydrotheca which encloses it.

Locality. New Zealand, *Mr. Busk's collection.*

I have elsewhere* given a general description of this remarkable hydroid, but without the technical diagnosis which I have here supplied. It is a beautiful little species, rendered striking by the regularity of its ramification, its distinctly separated perfectly symmetrical pairs of hydrothecæ and its large curiously ornamented gonangia borne in pairs corresponding to those of the hydrothecæ out of which they spring.

The peduncle of the gonangium nearly fills the cavity of the long tubular hydrotheca, from the very bottom of which it springs. It is covered with a delicate chitinous perisarc, and immediately on emerging from the cavity of the hydrotheca carries the gonangium on its summit. Its cœnosarc is doubtless continuous at the bottom of the hydrotheca with that of the common stem; but as the specimens examined had all been dried before I received them, the exact relation of the soft parts could not be determined.

In the dried trophosome itself there is nothing exceptional. Indeed, so far as this part of the hydroid is concerned, there is nothing which would separate it generically from a typical *Sertularia*.

Whether those hydrothecæ from which the peduncles of the gonangia emerge ever carried hydranths which subsequently became replaced by the gonosome, or whether they have been all along exclusively devoted to the gonosome, it is impossible to determine from dead and desiccated specimens.

* 'Gymnoblatic Hydroids,' p. 229.

THUIARIIDÆ.

THUIARIA.

The characters which have been hitherto employed in the definition of the genus *Thuiaria* are altogether inadequate. The species have all a very distinctive aspect, and the whole facies of the forms which are referable to this genus is so characteristic as at once to strike the observer; and yet in the attempts hitherto made to define the genus not a single character has been introduced which will not just as well apply to some of the typical Sertulariidans.

The peculiarity which has been regarded as of sufficient importance to constitute the essential character of the genus *Thuiaria* is the more or less completely adnate condition of the hydrothecæ to the hydrocaulus, which gives to these receptacles the appearance of being immersed in the substance of the stem and branches. The degree, however, in which this condition presents itself varies greatly in the different species; and the character is just as decided in many species rightly referred to *Sertularia* or *Sertularella*.

The adnate condition of the hydrotheca affords, in fact, no distinctive character at all; and if *Thuiaria* is to stand as a legitimate genus, some other character must be sought for. Now this will be found in the mode of division of the hydrocaulus into internodes. In all the true Sertulariidans (*Sertularia*, *Sertularella*, *Diphasia*) there is a joint occurring at regular intervals between every two or every two pairs of hydrothecæ quite irrespectively of the degree of adhesion of the hydrotheca to the hydrocaulus; while in *Thuiaria* the joints occur at distant and, for the most part, irregular intervals, thus leaving numerous hydrothecæ to be carried on each internode. It is this, combined with the far less distinctive feature of the more or less adnate condition of the hydrothecæ, which gives its peculiar aspect to a *Thuiaria*, and which must be taken as the essential character of the genus*.

THUIARIA.

THUIARIA CRASSICAULIS. Plate XVI. figs. 1-5.

Trophosome. Hydrocaulus attaining a height of six inches, very

* Guided by this character, some of the species hitherto included among the true Sertularians must be removed to *Thuiaria*. Thus the *Sertularia argentea* and *S. cupressina* of authors are true *Thuiariae*. Indeed *S. cupressina*, even in subordinate details, the immersion of its hydrothecæ and its peculiar ramification, is in all respects a typical Thuiarian.

thick, having, just above the base, a diameter of $\frac{2}{10}$ of an inch, irregularly branched; hydrothecal ramuli dichotomously divided, forming fan-shaped groups, which are disposed upon the main stem in a closely set spiral, a joint for the most part at the proximal side of each bifurcation. Hydrothecæ alternate, flask-shaped, with a short blunt tooth at each side of the orifice, separated from one another by slight intervals towards the proximal parts of each fan-shaped group of ramuli, but closely approximated towards the distal parts, where the base of each hydrotheca is slightly overlapped by the summit of that below it.

Gonosome. Gonangia forming two alternating rows on the upperside of the hydrotheca-bearing ramuli, each gonangium springing from a point just below the base of a hydrotheca, obconical, crowned with eight short thick spines which surround the broad summit, in the centre of which is the slightly elevated orifice; margin of orifice with minute teeth, which are directed towards the centre.

Locality. Japan, *Capt. St. John.*

This species is especially remarkable for the great thickness of its stem. The thick chitinous walls of the stem are traversed by very numerous irregular longitudinal canals, which, for the most part, communicate laterally with one another and with the great irregular central canal. This central canal, in the specimen examined, was bounded by a wall of chitine much thicker, but lighter-coloured, than that which surrounded the more external canals. The remains of the cœnosarc were visible not only in the central, but in some of the external canals; and it is probable that in a living state they were all pervaded by it.

THUIARIA CORONIFERA. Plate XVII. figs. 1-3.

Trophosome. Main stem attaining a height of more than 4 inches, sparingly branched, not fasciated, slightly zigzag, carrying dichotomous hydrothecal ramuli, which are spirally disposed around the stem, extending backwards for some distance from the summit. Hydrothecæ flask-shaped, alternate.

Gonosome. Gonangia [female] borne upon the upperside of the hydrothecal ramuli, springing each from a point just below the base of a hydrotheca, obovate, crowned by about nine hollow bifurcating spines, whose length equals that of the gonangium.

Locality. Japan, *Capt. St. John.*

The specimen examined was plainly a part of a female colony,

and contained within the cage-like chamber formed by the spines of the gonangium a well-preserved acrocyst. I have no knowledge of the form of the gonangia in the male; but, judging from analogy, they are probably destitute of the marsupial chamber and acrocyst which characterize the female. This species is thus distinguished by the peculiar form of its female gonangia, which differ from those of the other described species of *Thuiaria* much as the female gonangia of *Diphasia* differ from those of *Sertularia*.

The specimen being imperfect, its actual height could not be ascertained. About four inches of the stem remained; but it had evidently been broken off at some distance from the root.

When the gonangia are young, they are obconical in form, with a broad, flat summit, and in this stage show no trace of marsupial spines. As the gonangium continues to increase in size it assumes an obovate form, and the spines begin to grow out round the margin of its summit. These are at first simple, and afterwards become bifurcate. There are three bifurcations in every spine, each branch of the first bifurcation dividing into two.

An extension of the cœnosarc is continued through the whole length of the spines, from the enlarged summit of the blastostyle; and as the blastostyle must be homologically regarded as a hydranth arrested and adapted to functions connected with reproduction instead of nutrition, I look upon the spines here in the same light as I regard the corresponding parts in the gonangium of *Diphasia*, namely as blastostylic tentacles, thus representing the tentacles of a hydranth which have lost their prehensile functions, become clothed with chitine, and adapted to the protection of the ova during an early period of their development.

The ova are formed as usual, in a sporosac which springs from the blastostyle within the gonangium, and are subsequently discharged into the marsupial chamber, where, however, they are not free, but continue for some time confined within an acrocyst.

THUIARIA BIDENS. Plate XVIII. figs. 1, 2.

Trophosome. Hydrocaulus attaining a height of 4 inches, springing from an entangled mass of tubular filaments, much and irregularly branched, pinnate, main stem and principal branches fascicled for some distance from their origin, becoming monosiphonic towards their extremities; pinnae alternate; hydrothecæ of the pinnae adnate in their entire height, alternate, following one another without an interval, somewhat swollen

below, slightly narrowing upwards, orifice with two narrow teeth projecting from the inner side of the margin; hydrothecæ of the main stem and branches separated from one another by considerable intervals.

Gonosome. Gonangia borne by the stem and pinnae, each springing from a point just below the base of a hydrotheca, nearly sessile, cvoid, with truncated summit, strongly annulated in their distal half or two thirds, orifice borne on the summit of a narrow tube which springs from the centre of the truncated summit.

Locality. New Zealand, *Mr. Busk's collection.*

This is a fine species, with a handsome plumose aspect, conferred on it by the pinnate disposition of its ultimate ramuli.

THUIARIA DOLICHOCARPA. Plate XIX. figs. 3, 4, and 4a.

Trophosome. Hydrocaulus attaining a height of about four inches, and formed by an undivided main stem with closely set pinnately disposed, simple, opposite ramuli. Hydrothecæ alternate, closely set on the ramuli, more distant on the main stem, diverging upwards; margin of orifice strongly toothed, with a deep notch on each side, separating it from the hydrocaulus, the notch surrounded by a thickened rim; teeth three on each side of the orifice, and one in front; hydrothecæ adnate to the pinnae from their base to the bottom of the marginal notch; pinnae with a strongly marked mesial keel running down each side; main stem not keeled, with joints at irregular intervals, and its hydrothecæ more distant, and with the margin less distinctly dentate than is the case with the hydrothecæ of the pinnae.

Gonosome. Gonangia springing by a small basal joint from the pinnae, close to the base of a hydrotheca, very long, being about twelve times the length of a hydrotheca, rapidly widening upwards for some distance from their origin, then becoming nearly cylindrical to within a short distance of the summit, and then continued by a short, tubular prolongation, which carries the terminal orifice.

Locality. Northern Island, New Zealand, *Dr. Andrew Sinclair, Mr. Busk's collection.*

Thuiaria dolichocarpa is a striking form, conspicuous by its pinnately disposed opposite ramuli, springing from a simple stem, and giving to the entire Hydroid an elegantly plumose habit, as well as by the strongly dentate margin of its hydrothecæ, and its greatly elongated gonangia. The strong keels running down, one on one side and the other on the opposite side of the pinna, to

which they give a somewhat prismatic form, constitute also a striking feature.

Only a single specimen of this species was contained in the collection. Its main stem was quite simple; and this is probably the general character of the species. Its hydrorhiza was not present.

THUIARIA CERASTIUM. Plate XVIII. figs. 3, 4.

Trophosome. Hydrocaulus attaining a height of about two inches, springing from a bundle of entangled tubular filaments, simple for some distance from the hydrorhiza, and then becoming dichotomously branched with great regularity; simple portion of hydrocaulus and its more proximal subdivisions fascicled, the rest of the subdivisions monosiphonic. Hydrothecæ tubular, with entire orifice, adnate to the hydrocaulus in their entire length, alternate; hydrothecæ of each series closely approximate to one another, directed alternately (when viewed from the free side) to the right and to the left.

Gonosome. Gonangia springing singly by a narrow point close to the angle of each subdivision of the dichotomous stems, broadly obovate, strongly annulated, opening at the broad distal end by a narrow tubular projection.

Locality. Northern Island, New Zealand, *Dr. Andrew Sinclair, Mr. Busk's collection.*

The very regular dichotomous ramification, with the gonangia situated in the axils of the branches, gives to this species a very striking aspect, and strongly suggests the form of inflorescence met with in certain common caryophyllaceous plants.

THUIARIA PERSOCIALIS. Plate XVII. figs. 4-6.

Trophosome. Hydrocaulus attaining a height of about $2\frac{1}{2}$ inches; main stem undivided, monosiphonic, sending off along its entire length pinnately disposed opposite ramuli, and having a well-marked transverse joint between every pair of ramuli; ramuli with a joint here and there at irregular intervals. Hydrothecæ deep flask-shaped, with entire, semielliptical orifice, those of each series separated from one another by scarcely any interval on the pinnæ, more separated on the main stem, subopposite, or opposite on the pinnæ, more decidedly opposite on the common stem. Axis of pinnæ frequently extended beyond the distal extremity as a cylindrical tube, destitute of hydrothecæ, and serving for attachment.

Gonosome not known.

Locality. Natal, *Mr. Busk's collection.*

The opposite regularly disposed pinnate ramuli of this species give it an elegantly plumose habit, while one of its most striking features will be found in the curious tendril-like prolongations of the pinnae. The Hydroid grows in crowded groups; and the tendril-like processes, after extending themselves for some distance, with a more or less tortuous course, finally adhere by their distal extremities to some part of the same or of neighbouring hydrophytons, so that the whole group becomes tied together into a complicated mass. The attachment of these processes is by their extreme ends, which are applied in a somewhat sucker-like fashion to the surface to which they adhere.

SELAGINOPSIS, gen. nov.

Trophosome. Hydrophyton consisting of a single axile tube, to which the hydrothecæ are adnate, and on which they are disposed in several longitudinal rows.

Gonosome. Not known.

The genus *Selaginopsis* is allied to *Grammaria*, Stimpson, from which it differs chiefly in consisting throughout of a single axile tube, to whose sides the comparatively short hydrothecæ are adnate, while in *Grammaria* the elongated hydrothecæ are continued into tubes which are combined into a fascicled stem. From *Cryptolaria*, Busk, it further differs in the polystichous disposition of its hydrothecæ, these being distichous in *Cryptolaria*.

With *Pericladium*, another Japanese genus, it has also strong affinities. From this, however, it differs in the disposition of its hydrothecæ in longitudinal series as well as in its totally different type of ramification.

Were we acquainted with its gonosome we should probably find other points either of alliance or divergence of which we are at present ignorant.

SELAGINOPSIS FUSCA. Plate XII. fig. 1, and Plate XIX. figs. 1, 2.

Trophosome. Hydrophyton attaining a height of 4 (or more) inches, irregularly branched, with joints at irregular intervals; branches contracted at their origin. Hydrothecæ with margin of orifice slightly waved, disposed in four rows along the stem and branches; the whole very dark brown and opaque.

Gonosome. Not known.

Locality. Japan, *Capt. St. John.*

The hydrophyton in the present species is very opaque and dark-coloured; when boiled in a solution of caustic potash, it becomes much lighter and more transparent; and it is only then that a knowledge of the true form of the hydrothecæ and of their relation to the other parts of the Hydroid can be obtained. It will be then seen that they are nearly cylindrical in form, with a very definite floor, and closely adhere to the sides of a continuous axile tube, with which the hydrotheca communicates by a central orifice in its floor. The hydrothecæ are disposed so as to form four longitudinal rows, which are approximated in pairs, so that two rows run down one side of the stem and two down the other.

The specimen was imperfect, and was in great part enveloped by the adherent tubes of the two Campanularians described above as *C. grandis* and *C. gracilis*.

PERICLADIUM, gen. nov.

Trophosome. Hydrothecæ more or less immersed and closely set round bifurcating ramuli, which spring from the sides of a common stem.

Gonosome. Gonangia scattered, springing from between the hydrothecæ.

The genus *Pericladium* approaches *Thuiaria*, from which, however, it differs in the disposition of its hydrothecæ. In *Thuiaria* the hydrothecæ are disposed distichally, being always arranged in two opposite longitudinal series, while in *Pericladium* they surround the ramulus on all sides.

PERICLADIUM BIDENTATUM. Plate XX. figs. 1-4.

Trophosome. Stem attaining a height of about 4 inches, simple, not fascicled; hydrothecal ramuli cylindrical, two or three times bifurcate, attaining a length of about $\frac{3}{4}$ of an inch, springing from the main stem in a close spiral. Hydrothecæ flask-shaped, immersed for the greater part of their length and arranged in imbricated or closely approximate alternating verticils, but towards the proximal end of the bifurcating ramulus separated from one another and irregularly scattered; orifice with an acute tooth on each side.

Gonosome. Gonangia carried on the upperside of the hydrothecal ramuli near their origin from the common stem, obovate,

contracting below into a short curved peduncle, marked by shallow transverse corrugations towards the summit, and terminated by a slightly elevated aperture.

Locality. Japan, *Capt. St. John.*

This Hydroid has much the habit of certain true *Thuiariæ*. It is a large and beautiful species. The specimens were loaded with gonangia, which were confined to the basal portion of each system of bifurcating ramuli, where the hydrothecæ are separated from one another by intervening spaces; it is from these spaces that the gonangia arise in two longitudinal rows upon the upperside of the ramulus. The gonangia-bearing portion of the ramulus is separated from the more distal portion by a transverse joint.

PLUMULARIIDÆ.

AGLAOPHENIA.

AGLAOPHENIA ACANTHOCARPA. Plate XXI. figs. 1-4.

Trophosome. Hydrocaulus attaining a height of upwards of three inches, irregularly branched, pinnae springing from the anterior aspect of the stem. Hydrothecæ closely approximate, rather deep, gradually expanding upwards, margin deeply toothed, with the second tooth from the front on each side strongly everted; intrathecal ridge strong, extending from about the middle of the back of the hydrotheca transversely to within a short distance of the anterior mesial line; mesial nematophore adnate to the front of the hydrotheca from its base to its margin, and then becoming free, and extending forwards and upwards as a long thickish beak-like process, in which there is a lateral as well as a terminal orifice; lateral nematophores overtopping the hydrotheca, very divergent in a front view; rachis of pinna with an imperfect septum continuous with the intrathecal ridge, and another oblique one at the base of the lateral nematophores.

Gonosome. Corbulæ open, with a short stalk, and with about eighteen pairs of free leaflets, which decrease in length towards the distal extremity of the corbula, and give off on each side numerous closely set, long, opposite, blunt spine-like nematophores; each leaflet with a double nematophore near its base.

Locality. New Zealand, *Mr. Busk's collection.*

This is a very elegant species, with much of the habit of our European *Aglaophenia pluma*. Its hydrothecæ are remarkable for the great development of the free portion of the mesial nema-

tophore—a character in which it agrees with Kirchenpauer's subgenus *Macrorynchia*, with which it further agrees in the fact of this free portion of the mesial nematophore being provided not only with a terminal orifice, but with the lateral one to which Kirchenpauer first drew attention as occurring in those forms which he united in his subgenus *Macrorynchia*. The species, however, included by Kirchenpauer in this subgenus have a gonosome very different from that of the present species, the gonangia of the *Macrorynchia* being unprotected by corbulæ, and merely supported on the surface of more or less modified pinnæ.

But the most striking feature of *Aglaophenia acanthocarpa* will be found in its beautiful corbulæ. The leaflets which form the walls of the corbula are free in their entire length, and carry along their opposed edges opposite pinnately disposed nematophores, each in the form of a blunt spine, and having both a terminal orifice and, close to its base, a lateral one, exactly as in the mesial nematophores of the hydrothecæ. The longest leaflets, which are situated near the proximal end of the corbula, carry about eleven pairs of nematophores; the shortest, which are at the distal end, carry usually from five to seven pairs; each leaflet, moreover, has a transverse joint between every pair of nematophores, and at its base carries upon one side two nematophores, which spring, by a common root, from the basal joint of the leaflet.

This double nematophore is especially interesting in a homological point of view; for it represents the two lateral nematophores of a hydrotheca, the mesial nematophore being represented in a greatly modified form by the leaflet itself, and the hydrotheca being entirely suppressed.

The short stalk by which the corbula is attached to the stem carries a single hydrotheca.

AGLAOPHENIA LAXA. Plate XXI. figs. 5-7.

Trophosome. Stem attaining a height of about two inches, fascicled below, irregularly or subalternately branched; branches all lying in the same plane, divided into rather long internodes, each internode carrying a pinna; pinnæ distant, each supported on a short process, which springs from the latero-anterior aspect of the hydrocaulus. Hydrothecæ approximate, rather deep, gradually widening upwards, margin deeply toothed, with the second tooth from the front everted; intrathecal ridge strong, situated

near the middle of the hydrotheca, and running transversely from its posterior to its anterior wall; median nematophore adnate to front of the hydrotheca nearly as far as the margin, and then projected as a free beak-like process, which is provided with a lateral as well as terminal orifice; lateral nematophores slightly overtopping the hydrotheca; cauline nematophores broad, two on each internode, one being situated immediately below, and the other immediately above the supporting process for the pinna.

Gonosome. None present in the specimen.

Locality. New Zealand, *Mr. Busk's collection.*

The length of the pinna-bearing internodes, and consequent intervals between the pinnæ are unusually great in this species; and the plumes thus present a rather open habit, which contrasts with the denser plumes of others. The hydrothecal internodes have three distinct diaphragms—one which is a continuation of the intrathecal ridge, one at the base of the lateral nematophores, and one at the base of the hydrotheca.

In the absence of all knowledge of the gonosome, the reference of the present species to the genus *Aglaophenia* is only provisional. It will be seen that in the possession of two orifices by the free portion of the mesial nematophore we have a character which Kirchenpauer assigns to his subgenus *Macrorynchia*. This, however, is by no means an exclusive character of the forms which he would include under *Macrorynchia* (see description given above of *Aglaophenia acanthocarpa*), while the general form of the hydrotheca in the present species agrees more closely with that of the true *Aglaopheniæ*.

The specimen was growing over the surface of a litoral fucus.

HALICORNARIA, *Busk* (modified).

Trophosome. Hydrocaulus with pinnate ramification. Hydrothecæ usually with an intrathecal ridge. Nematophores fixed; mesial nematophore adnate for a greater or less extent to the front of the hydrotheca, rarely free.

Gonosome. Gonangia not included in corbulæ or protected by gonangial ramuli, but carried on the common stem, or on more or less modified hydrothecal pinnæ.

The genus *Halicornaria* was originally instituted by Busk to include certain Plumulariidæ, in which the reproductive capsules were not included in basket-like receptacles or corbulæ. Within its original limits it would have included the species referable to

the type of *Plumularia setacea*, Linn. With our present more extended knowledge of the Plumulariidae, however, it must be restricted to species which, with a trophosome formed on the general type of *Aglaophenia pluma*, have their gonangia never included in corbulæ, or connected in any way with the special gonangial ramuli which in certain other species we find developed for their protection.

Dr. Kirchenpauer, in his valuable memoir on the genus *Aglaophenia*, institutes under the name of *Macrorynchia* a subgenus for certain forms with unprotected gonangia, giving, however, as the chief character of the group, the great development of the free portion of the mesial nematophore, and its being provided with a lateral as well as a terminal orifice. This condition of the mesial nematophore, however, we have seen to exist in a true corbula-bearing species (*Aglaophenia acanthocarpa*); and it probably occurs in many others besides those which Kirchenpauer would refer to his subgenus *Macrorynchia*. The genus *Halicornaria* would include not only the forms embraced by Kirchenpauer in his *Macrorynchia* group of *Aglaopheniæ*, but others, which, with unprotected gonangia, do not possess the double-mouthed nematophore.

HALICORNARIA SACCARIA. Plate XV. fig. 4, and Plate XXII. figs. 1, 2.

Trophosome. Hydrocaulus attaining a height of about 9 inches, rooted by a spongy mass of entangled filaments, much and very irregularly branched, fascicled, very thick towards the base, and thence gradually thinning away as the polysiphonic condition becomes less and less, until towards their distal extremities the branches have entirely lost their fascicled condition and become monosiphonic; pinnæ alternate, arising from the anterior surface of the rachis. Hydrothecæ with the orifice directed forward; margin waved, but not dentate; anterior walls deeply inflected just below the orifice; intrathecal ridge rudimental; mesial nematophore adnate to the hydrotheca for about half the height of the hydrotheca, and then forming a rather long, stout, free spine, having, besides its terminal aperture, a lateral one on its upper side close to the point where it becomes free; lateral nematophores nearly cylindrical, long, extending beyond the orifice of the hydrotheca; a double cauline nematophore just below the origin of each pinna.

Gonosome. Gonangia borne singly on a short pinna, which

carries usually two hydrothecæ at the proximal side of the gonangium, and at its distal side is reduced to a short blunt spine destitute of hydrothecæ; gonangia oval, greatly compressed, concave on one side and convex on the other, with a transparent wing-like margin; sporosac encircled near its summit by a band of refringent roundish corpuscles.

Locality. Ceylon, *Mr. Holdsworth.*

This is a loosely branched straggling species; the peculiar form of the hydrothecæ, with the deep inflexion below the margin, somewhat resembles that of a sac constricted by a cord below its mouth, and has suggested the specific name.

The remarkable band by which the solitary sporosac which occupies the gonangium is encircled, is composed of highly refringent spherical corpuscles, which by mutual pressure have become more or less polygonal. They possess a central nucleus-like body, which, when the gonangia are subjected to a short boiling in a solution of caustic potash, becomes resolved into a cluster of granules. It is impossible to form any valid conclusion as to the significance of these bodies; they are certainly not ova.

The gonangium is solitary, and is borne on a shortened hydrothecal pinna whose proximate two hydrothecæ present the normal condition, while the third hydrotheca is replaced by the gonangium, its mesial and lateral nematophores continuing, with but slight arrest, to occupy their usual position, so that the mesial nematophore is placed in front of the gonangium, where it remains free, and the lateral nematophores one on each side of it and distally. That portion of the pinna which lies at the distal side of the gonangium has become arrested and reduced to the condition of a thick blunt spine.

Were it not for the much less modified condition of the pinna which carries the gonangium, the present species would form a typical example of Dr. Kirchenpauer's macrorynchial section of *Aglaophenia*.

HALICORNARIA INSIGNIS. Plate XXIII. fig. 1, and Plate XXII. figs. 3, 4.

Trophosome. Hydrocaulus attaining a height of 9 inches, simple, monosiphonic, closely set with opposite pinnae. Hydrothecæ with a very long recurved and strongly divergent tooth on each side, intrathecal ridge strong, extending from about the middle point

of the mesial line in front to a point about halfway between the anterior and posterior walls of the hydrotheca; mesial nematophore very long, adnate to the whole height of the anterior wall of the hydrotheca, and then extending for a distance about equal to the length of its adnate portion as a free, gently recurved, hollow spine, with a lateral as well as a terminal orifice.

Gonosome. Not known.

Locality. Ceylon, Mr. Holdsworth.

This is a beautiful species; its long flexible and eminently graceful plumes grew in rich masses over the stems of another large Hydroid (*Halicornaria bipinnata*). In some of the specimens examined an imperfect septum was apparent, stretching across the cavity of the mesial nematophore at a little distance from its terminal orifice. This, however, was by no means of constant occurrence. The opposite, instead of alternate, disposition of the pinnae on the common stem is a condition of very rare occurrence among the Plumulariidæ.

As no gonosome was present in any of the specimens examined, the reference of the species to *Halicornaria* is provisional; the general character of the hydrothecæ, however, belonging as these do to the macrorynchial type, renders it probable that the species is correctly allocated to *Halicornaria*.

HALICORNARIA BIPINNATA. Plate XXIII. fig. 2, Plate XXII. fig. 5.

Trophosome. Hydrocaulus attaining a height of upwards of a foot, fasciated, rooted by a dense sponge-like mass of entangled fibres, strong and thick at its origin, where it measures about a quarter of an inch in diameter, and soon thinning away as it becomes irregularly branched; branches mostly in the same plane, sending off along their whole length rather closely set, short, alternate pinnae, which are destitute of hydrothecæ, and along the intervening spaces short, slender, hydrotheca-bearing pinnae; non-hydrotheca-bearing pinnae rigid, fasciated at their origin, thinning away and becoming monosiphonic towards their distal extremities, carrying very short secondary, alternate, monosiphonic hydrotheca-bearing pinnae, each secondary pinna springing from a short internode of the primary pinnae. Hydrothecæ closely set, deep, with the anterior wall deeply involuted below the orifice, which is directed forward; margin of orifice extended in the form of a broad wing-like cheek on each side; intrathecal ridge situated near the base of the hydrotheca, and extending

forwards for a short distance from its posterior wall; mesial nematophore adnate for the greater part of the height of the hydrotheca, and then becoming free for a short distance; lateral nematophores long, cylindrical, diverging; each internode of the primary pinnæ carrying two cauline nematophores close to the base of the secondary pinna.

Gonosome. Gonangia compressed, cup-shaped, opening by a wide orifice at the distal end, springing by a very short latero-basal peduncle from the back of each secondary pinna close to its origin.

Locality. Ceylon, *Mr. Holdsworth.*

The doubly pinnate ramification of *H. bipinnata* impresses on the Hydroid a striking physiognomy. The species is rendered still further remarkable by the large size of its strong rigid hydrocaulus, while the branches, being given off to the right and left, lie mostly in the same plane, and confer on it somewhat the aspect of certain species of *Antipathes* or *Gorgonia*. The hydrothecæ are proportionally small; and the pinnæ which carry them are slender and easily detached from the rest of the hydrocaulus. Though the hydrothecæ resemble those of the macrorynchial species in the forward direction of the orifice and in the deep involution of the anterior wall, the free portion of the mesial nematophore is but little developed, and is provided with only the terminal aperture.

The main stem and branches are strongly fascicled; and the principal tube of the primary non-hydrotheca-bearing pinnæ (that from which the secondary pinnæ arise) is accompanied by two or three tubes from the branches, which, however, soon cease; and the primary pinna then continues its course as a single tube.

Some of the specimens were loaded with gonangia, which were always very thin-walled and provided with a very wide orifice; but how far the form of these receptacles in the dried specimens corresponded with their condition in the living animal is somewhat doubtful. Their origin from the back of the hydrocaulus is very remarkable, and quite exceptional in the group.

DESCRIPTION OF THE PLATES.

[All the magnified figures, and many of those representing the species of its natural size, are from drawings made from nature by the author. The figures on Plate XXIII., and some of the other natural-size figures, are from drawings by Mr. A. T. Hollick.]

PLATE IX.

- Figs. 1, 2. *Perigoninus multicornis*.
 1. Natural size.
 2. A portion, magnified.
- 3, 4. *Endendrium rigidum*.
 3. Natural size.
 4. A portion, magnified.
- 5, 6. *Amalthæa islandica*.
 5. Natural size.
 6. Magnified.
- 7, 8. *Monocaulus grænlandica*.
 7. Natural size.
 8. Magnified.

PLATE X.

- Figs. 1-3. *Hydractinia monocarpa*.
 1. A colony, natural size, growing over the shell of *Trophon clathratus*.
 2. A portion of the colony, magnified.
 3. Longitudinal section of one of the chitinous spines: *a*, external laminated layer; *b*, internal laminated layer; *c*, axile cavity.
- 4, 5. *Podocoryne inermis*.
 4. Natural size, spreading over the shell of *Nassa reticulata*.
 5. Portion of a colony, magnified.
- 6, 7. *Cladocoryne pelagica*.
 6. Natural size, growing over the surface of an air-vesicle of *Sargassum bacciferum*.
 7. Portion of a colony with hydranth and gonophores, magnified.

PLATE XI.

- Figs. 1, 2. *Campanularia crenata*.
 1. Natural size.
 2. Magnified.
- 3, 4. *Campanularia juncea*.
 3. Portion of a colony, natural size.
 4. Portion, magnified.

PLATE XII.

Fig. 1. *Selaginopsis fusca* and *Campanularia grandis*, natural size. (For magnified details of *Selaginopsis fusca*, see Pl. XIX. figs. 1, 2.)

1 a, a. *Selaginopsis fusca*.

1 b, b, b. *Campanularia grandis*.

2. *Campanularia grandis* and *Campanularia gracilis*, magnified.

2 a, a. *Campanularia grandis*.

2 b, b, b. *Campanularia gracilis* growing over the surface of *Campanularia grandis*.

Young individuals with their hydrorhizal disks have attached themselves to the hydrothecæ of the large *Campanularia*.

3. Gonangium of *Campanularia grandis*, magnified.

4. *Campanularia gracilis*, natural size.

PLATE XIII.

Figs. 1, 2. *Sertularella Johnstoni*.

1. Natural size.

2. A portion, magnified.

3, 4. *Sertularella integra*.

3. Natural size.

4. A portion, magnified.

5-7. *Sertularella episcopus*.

5. Natural size.

6. A portion, magnified.

7. Outline of transverse section of gonangium.

PLATE XIV.

Figs. 1, 2. *Sertularia arctica*.

1. Natural size.

2. A portion, magnified.

3-7. *Desmoscyphus Buskii*.

3. Natural size.

4. A portion of main stem and branch, magnified, lateral view.

5. A portion of a branch, magnified, front view.

6. Same, back view.

7. Same, oblique view.

PLATE XV.

Figs. 1-3. *Synthecium elegans*.

1. Natural size.

2. Magnified.

3. A portion with gonangia, still further magnified.

Fig. 4. *Halicornaria saccaria*, natural size. (For magnified details of this species see Pl. XXII. figs. 1, 2.)

PLATE XVI.

Figs. 1-5. *Thuiaria crassicaulis*.

1. A nearly perfect colony, natural size.
2. Portion of a bifurcating branch, magnified.
3. Portion of same, more magnified; lateral view of hydrothecæ with gonangium.
4. Same, front view of hydrothecæ.
5. Transverse section of stem near proximal end, magnified, showing the great central irregular canal and the peripheral canals in the thick chitinous perisarc.

PLATE XVII.

Figs. 1-3. *Thuiaria coronifera*.

1. Natural size.
2. Part of a branch, magnified.
3. Hydrotheca, front view.

4-6. *Thuiaria persocialis*.

4. Natural size.
5. A portion, magnified, showing the tendril-like processes.
6. Hydrotheca, front view.

PLATE XVIII.

Figs. 1, 2. *Thuiaria bidens*.

1. Natural size.
2. A portion, magnified.

3, 4. *Thuiaria cerastium*.

3. Natural size.
4. A portion, magnified.

PLATE XIX.

Figs. 1, 2. *Selaginopsis fusca*.

1. A portion of the hydrophylon in its natural condition, magnified.
2. A portion after having been boiled in a solution of caustic potash, showing the form and relation of the hydrothecæ.

(For *Selaginopsis fusca*, natural size, see Pl. XII. fig. 1 *a*, *a*.)3, 4, 4^a. *Thuiaria dolichocarpa*.

3. Natural size.
4. Portion of a pinna, magnified, with proximal portion of hydrotheca.
- 4^a. Distal portion of same hydrotheca.

PLATE XX.

Figs. 1-4. *Pericladium bidentatum*.

1. A portion of a colony, natural size.
2. One of the bifurcating branches, magnified.
3. A portion of a branch near its proximal end, with gonangia, still more magnified.
4. A portion of a branch near its distal end, magnified still further.

PLATE XXI.

Figs. 1-4. *Aglaophenia acanthocarpa*.

1. A colony, natural size.
2. Portion of a pinna, magnified, lateral view.
3. Same, front view.
4. A corbula, magnified. (In order to give the figure greater clearness the leaflets of one side are omitted.)

5-7. *Aglaophenia laxa*.

5. A colony, natural size.
6. Portion of a pinna, magnified, lateral view.
7. Same, front view.

PLATE XXII.

Figs. 1, 2. *Halicornaria saccaria*.

1. A portion of stem with two pinnæ, one carrying a gonangium, magnified, lateral view.
2. A gonangium, less magnified than in fig. 1, front view.
(For *Halicornaria saccaria*, nat. size, see Pl. XV. fig. 4.)

3, 4. *Halicornaria insignis*.

3. Portion of a pinna, magnified, lateral view.
4. One of its hydrothecæ, front view.
(For *Halicornaria insignis*, nat. size, see Pl. XXIII. fig. 1.)

Fig. 5. *Halicornaria bipinnata*, portion of stem and pinna, magnified.(For *Halicornaria bipinnata*, nat. size, see Pl. XXIII. fig. 2.)

PLATE XXIII.

Fig. 1. *Halicornaria insignis*, nat. size.2. *Halicornaria bipinnata*, nat. size, drawn from a small specimen.

(For the magnified details of this plate see Plate XXII. figs. 3, 4, 5.)

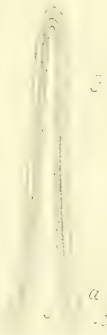




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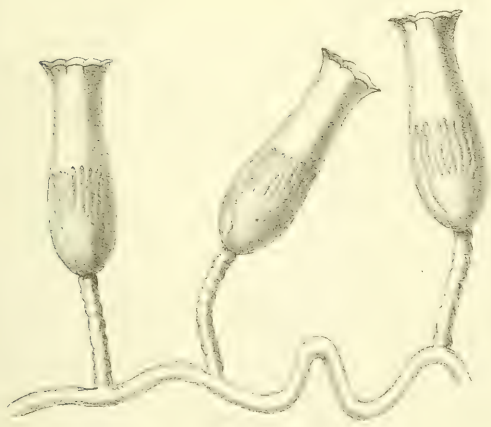
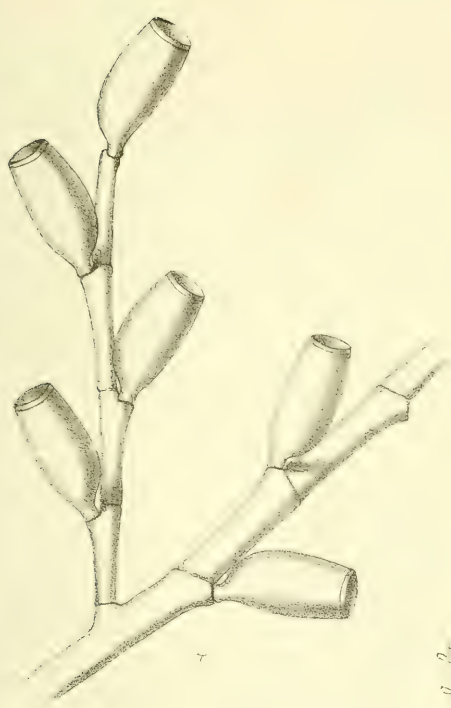
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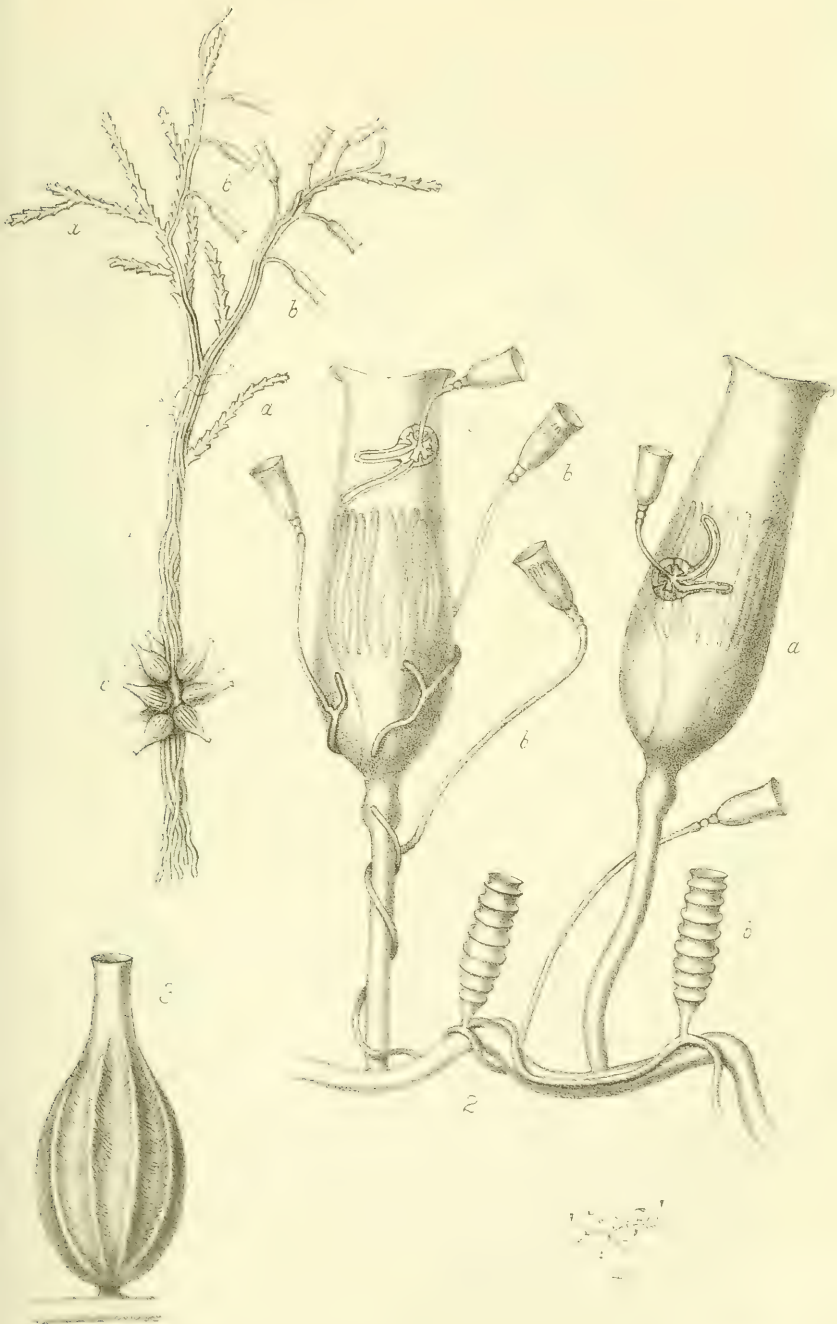


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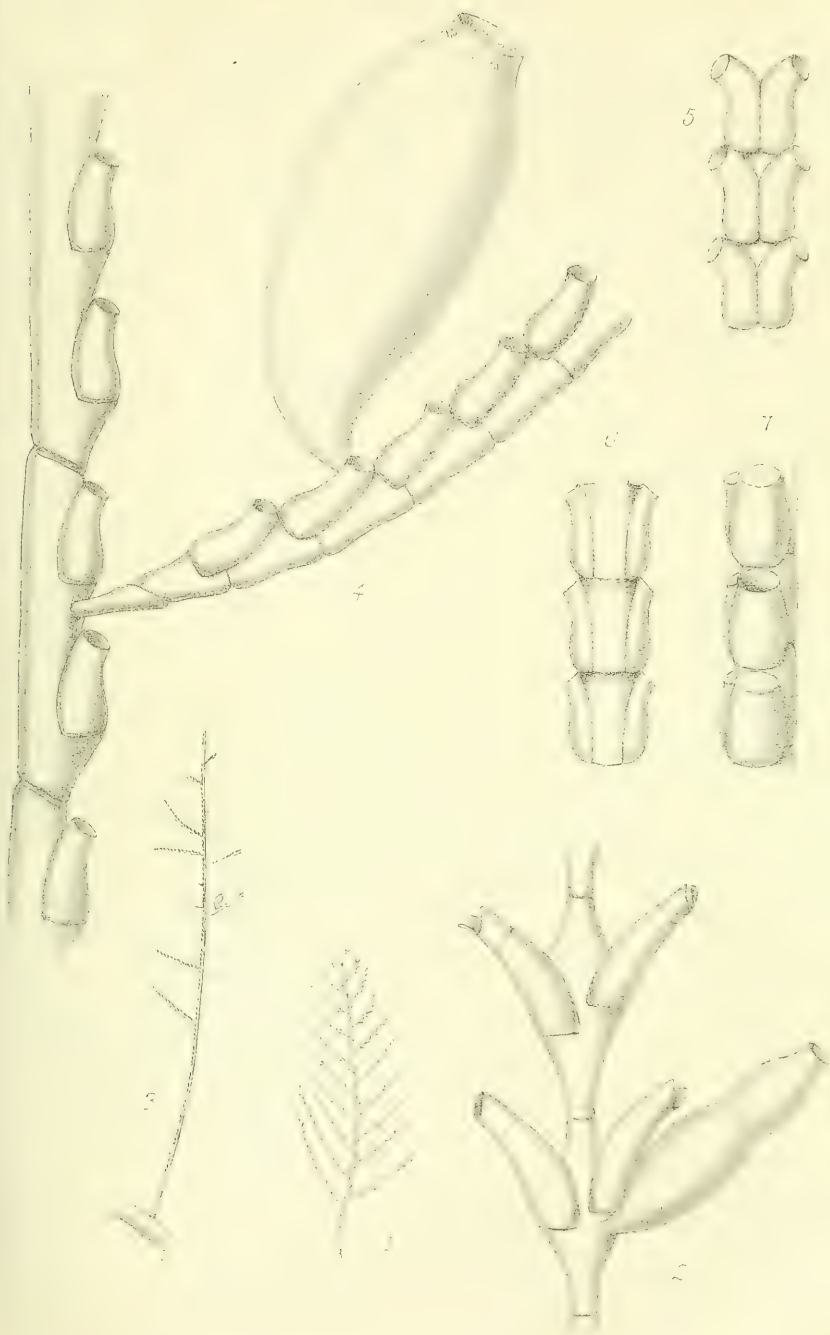
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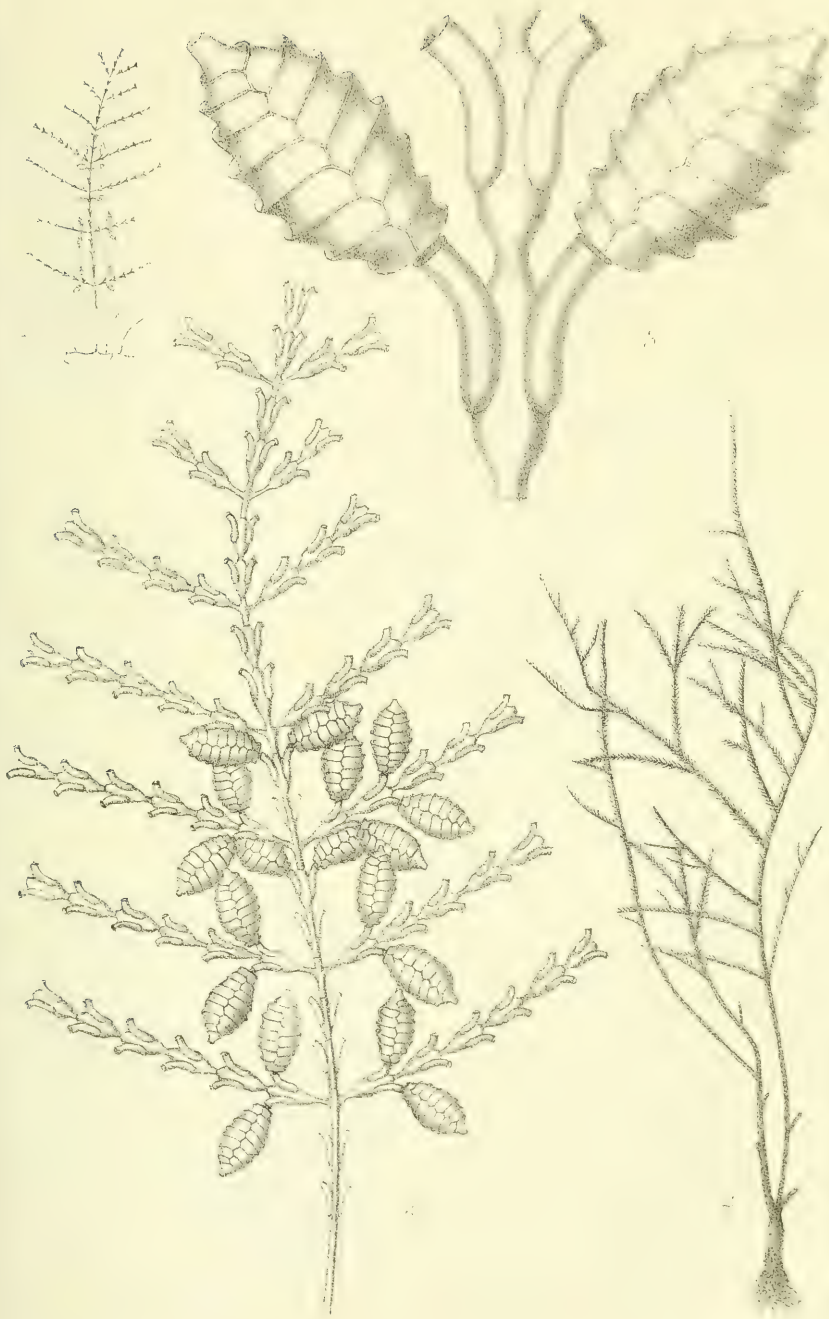




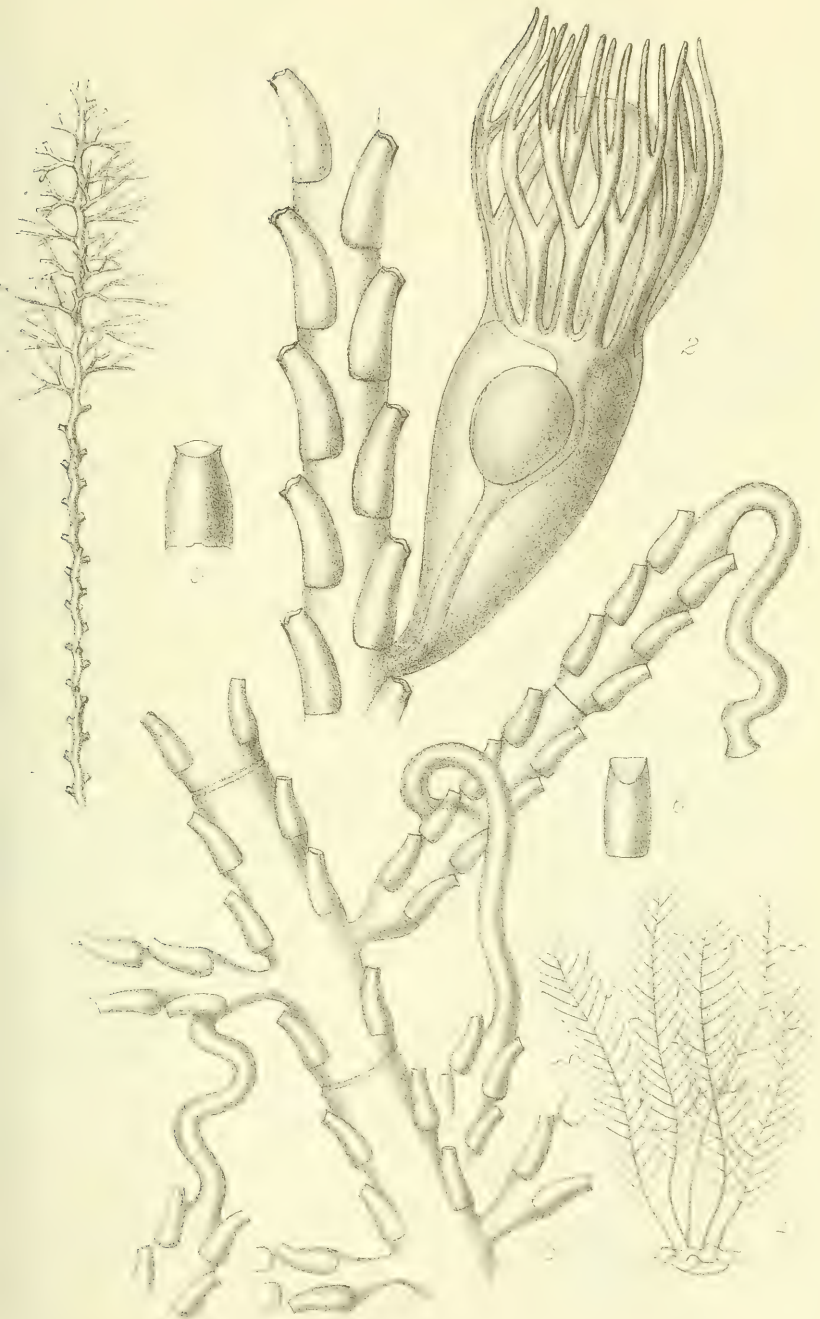


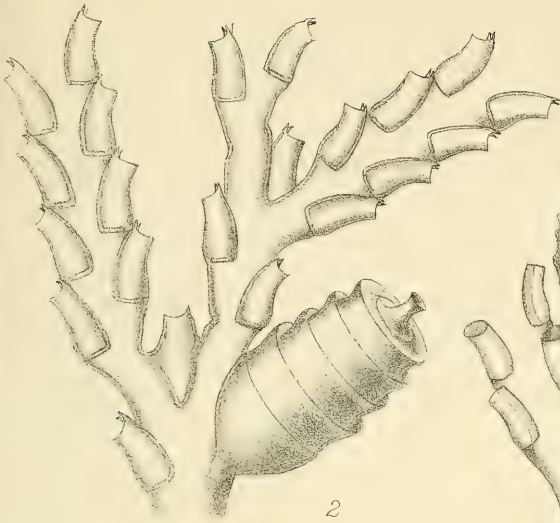




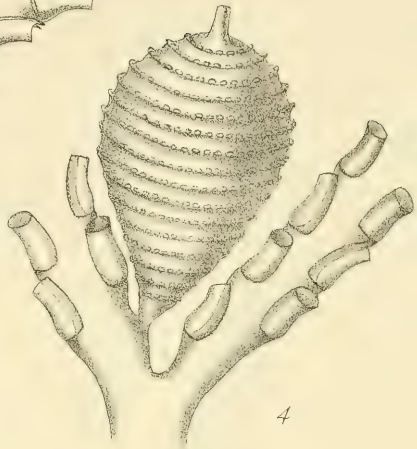








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